



## Wind and Water

### ★ TEKS

Science - Ch112

3.2 3.4 3.5 3.7 3.10 3.11 4.2 4.4 4.5 4.7 4.11 5.2 5.4 5.5 5.7  
5.12

Grades 3-6  
Duration 90min  
Setting Classroom

**Focus** Demonstrate wind and water erosion.

➞ Read side 2 for Background.

**Objective** The student's task is to test how wind and rain work to bring about erosion.

- Procedure**
- Working in pairs, have students cover work areas with newspaper, and close their erosion tray's hole with a cork.
  - Using cardboard and masking tape have each team construct a 3-sided, 8-inch, standing shield for their tray.
  - The students should add one handful of each soil to the tray, mix them together and shape the soil into a hill.
  - Ask the students to speculate and record their predictions in their journals:
    - What might happen if air is blown over the hill?
    - What will happen if water is poured over the hill?
  - Standing at the open side of the tray, have one partner blow gently through the straw onto the hill. Teams should record:
    - What force does this represent?
    - Which of the soils is blown from the hill most easily?
    - Which materials stayed on the hill the longest?
    - What could be added to the model to reduce wind erosion?
  - After removing their cardboard shields, have the students rebuild their hills mixing 10ml of water with the soils.
  - With 60ml (2oz) of water have them pour the water back and forth across their reconstructed hill. Team members should record their results separately.
  - Rebuild the hill again, this time creating vertical and horizontal grooves on its opposing sides. Pour a small amount of water on each side of the hill. Record the results
    - What do they observe this time?
    - How do the grooves affect the water's erosive capacity?
  - Ask the students to speculate: If they were farmers, what method could be used to wind and water erosion on a hilly field?

### Materials

- 1 measuring cup
- 1 Journal page
- 3 pieces of cardboard
- 1 bag of pebbles
- 1 bag of sand
- 1 bag of clay soil
- 1 cork/stopper
- 1 straw
- 1 roll masking tape
- 1 erosion tray
- newspaper
- paper towels
- scissors



### Did You Know?

*It takes about 500 years for one inch of topsoil to form.*

*Researchers have found that some soils in India, Africa and Australia are more than 2million years old.*

*Ice is the most powerful erosive force on Earth. All over the world, the effects of ice can be seen in great valleys carved out by moving glaciers during the ice ages. Huge boulders can be carried vast distances by glaciers.*

➞ Read side 2 for Background.



## Wind and Water

### Background

Two processes continually occur on Earth: those that modify it or build it up, and those that break it down. Forces such as volcanic eruptions, earthquakes, and the movement of magma continually push up and create new land, while forces such as weathering and erosion wear down the land. Erosion occurs when wind, water, and glaciers move weathered particles to other locations. The process is powerful enough to form deep valleys, as well as level hills and mountains.

#### Mechanics of Erosion

**Soil erosion** is the loss of topsoil (the nutrient-rich surface layer) from the ground. This usually happens because of the movement of air (wind) and water. Heavy rains wash away the soil, especially where the ground slopes and there are no plants, or where plant roots have not yet taken hold.

When the soil is dry, the wind causes erosion. During a period of dry weather (**drought**), wind erosion is a big problem for farmers. They lose huge amounts of rich topsoil to the wind. Farmers often plant **windbreaks**—thick rows of trees and other plants to line their fields and slow down erosion.

**Wind erosion** is most obvious in dry, desert areas. In regions where there is no sheltering vegetation, the wind can strip off dry soils. Only small particles are carried by the wind. But the force of flowing water, or **hydraulic action**, can move much larger fragments.

The faster the water flows, the larger the fragments are that it is able to shift. Water from rainfall or melting snow that runs downhill often takes particles of rock and soil along with it. Rocks carried along in the water are gradually reduced in size, and become smooth and rounded as they bounce along the riverbed and against each other. This process is called **attrition**, and it happens also to smaller, windblown particles.

Most of the power of wind, water and ice to strip away rocks comes from the abrasive effect of the rock fragments which these mediums carry. This is called **corrasion**. In deserts, windblown sand scours rock surfaces into fantastic honeycomb shapes. Rocks carried by a river current widen the actual riverbed by knocking

out more material along the way. Along shorelines, the tides grind sand and pebbles against rock surfaces.

#### Two Weathering Methods

Weathering, which is a long, slow process, is the continuous breaking down of rock. Weathering can be physical or chemical. **Physical weathering** happens when wind, water, and temperature changes break down rocks into smaller pieces without changing the minerals in the rock. **Chemical weathering** occurs when chemicals created from certain acids, and water, break down rocks. Chemical weathering actually alters the minerals in the rocks.

The two weathering processes work together. Physical weathering exposes new surfaces of rock that can be acted upon more easily by chemical weathering. At any depth accessible to air and water, rocks are weathered physically and chemically. (That's how caves are formed.)



#### Did You Know?

*The greatest wind speed recorded on Earth was 230mph on the summit of Mount Washington in New Hampshire. Even greater winds develop inside severe tornadoes.*

*In Cherripungi, India, 2187cm (861in) of rain fell during the 1861 monsoon season.*

*The Atacama Desert in Northern Chile had no rain between 1903 and 1917, totaling 5206 days.*

*In the 1930s, farmers on America's prairie learned a bitter lesson about topsoil. They failed to return organic matter to the soil after years of raising the same crops. Their top soil became a fine dust that was blown away by the tons. As a result, their farmlands were called dust bowls.*

#### Bibliography & Sources

Science in a Nutshell: Cluster Teacher's Guide-Earth Works  
by Mike Graf & Marianne Knowles (p9, A109)  
Delta Education Inc., 2000

Rocks and Soil  
by Robert Snedden (p32)  
Raintree Steck-Vaughn Publishers, 1999